Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] An optical transmitter for an optical fiber transmission system, the optical transmitter comprising:

an optical source that generates an optical signal having a wavelength at an output;

an optical intensity modulator having an optical input that is coupled to the output of the optical source, an electrical input that receives an electrical modulation signal, and an output, the optical intensity modulator modulating the optical signal with the electrical modulation signal to generate a modulated optical signal at the output, wherein at least one parameter of the optical intensity modulator is chosen to suppress at least one of phase and sideband information in the modulated optical signal; and

an optical fiber that is coupled to the output of the optical intensity modulator, wherein the suppression of the at least one of the phase and the sideband information in the modulated optical signal increases an effective modal bandwidth of the optical fiber.

[c2] The optical transmitter of claim 1 wherein the optical source comprises a laser that generates the optical sig-

nal.

[c3] The optical transmitter of claim 1 wherein the optical signal generated by the optical source comprises a continuous wave optical signal.

[c4] The optical transmitter of claim 1 wherein the optical signal generated by the optical source comprises a phase and amplitude locked optical pulsed signal.

[c5] The optical transmitter of claim 1 wherein the optical source and the optical intensity modulator comprise an electro-absorption modulated laser.

[c6] The optical transmitter of claim 1 wherein the optical source and the optical intensity modulator comprise an integrated laser modulator.

[c7] The optical transmitter of claim 1 wherein the optical source comprises a WDM optical source that generates a plurality of optical signals, each of the plurality of optical signals having a different wavelength.

[c8] The optical transmitter of claim 1 further comprising a second optical source that generates a second optical signal having a second wavelength at an output; and a second optical intensity modulator having an optical input that is coupled to the output of the second optical

source, an electrical input that receives a second electrical modulation signal, and an output, the second optical intensity modulator modulating the second optical signal with the second electrical modulation signal to generate a second modulated optical signal at the output, wherein at least one parameter of the second optical intensity modulator is chosen to suppress at least one of phase and sideband information in the second modulated optical signal.

[c9] The optical transmitter of claim 1 wherein the at least one parameter of the optical intensity modulator comprises a bandwidth of the optical intensity modulator.

[c10] The optical transmitter of claim 1 wherein the at least one parameter of the optical intensity modulator comprises an absorption spectrum of the optical intensity modulator.

[c11] The optical transmitter of claim 1 wherein the at least one parameter of the optical intensity modulator comprises an extinction ratio of the optical intensity modulator.

[c12] The optical transmitter of claim 1 wherein the at least one parameter of the optical intensity modulator comprises an absorption coefficient of the optical intensity

modulator.

[c13] The optical transmitter of claim 1 further comprising an optical isolator that substantially eliminates reflected optical signals from propagating into the output of the optical intensity modulator.

[c14] The optical transmitter of claim 1 wherein the optical fiber comprises a single-mode optical fiber.

[c15] The optical transmitter of claim 14 further comprising a spatial mode filter having an input that is coupled to an output of the single-mode optical fiber and an output that is coupled to an input of a multi-mode optical fiber.

[c16] The optical transmitter of claim 1 wherein the optical fiber comprises a multi-mode optical fiber.

[c17] The optical transmitter of claim 1 wherein the at least one parameter is chosen to increase immunity of the effective modal bandwidth of the optical fiber to polarization effects occurring in at least one of the optical source and the optical fiber.

[c18] The optical transmitter of claim 1 wherein the at least one parameter of the optical intensity modulator is chosen to increase immunity of the effective modal bandwidth of the optical fiber to changes in temperature of at

least one of the optical source and the optical fiber.

[c19] The optical transmitter of claim 1 further comprising a bias voltage power supply having an output that is coupled to a bias input of the optical intensity modulator, the bias voltage power supply generating a voltage that suppresses at least one of phase and sideband information in the modulated optical signal.

[c20] A multi-mode optical transmission system comprising:

an optical source that generates an optical signal having a wavelength at an output;

an optical intensity modulator having an optical input that is coupled to the output of the optical source, an electrical input that receives an electrical modulation signal, and an output that is coupled to an input of a single-mode optical fiber, the optical intensity modulator modulating the optical signal with the electrical modulation signal to generate a modulated optical signal at the output, wherein at least one parameter of the optical intensity modulator is chosen to suppress at least one of phase and sideband information in the modulated optical signal;

a spatial mode filter that is coupled to an output of the single-mode optical fiber; and

a multi-mode optical fiber having an input that is coupled to an output of the spatial mode filter,

wherein the suppression of the at least one of the phase and the sideband information in the modulated optical signal increases an effective modal bandwidth of the multi-mode optical fiber.

[c21] The transmission system of claim 20 wherein the optical source and the optical intensity modulator comprise an electro-absorption modulated laser.

[c22] The transmission system of claim 20 wherein the optical source and the optical intensity modulator comprise an integrated laser modulator.

[c23] The transmission system of claim 20 wherein the optical source comprises a WDM optical source that generates a plurality of optical signals, each of the plurality of optical signals having a different wavelength.

[c24] The transmission system of claim 20 further comprising a second optical source that generates a second optical signal having a second wavelength at an output; and a second optical intensity modulator having an optical input that is coupled to the output of the second optical source, an electrical input that receives a second electrical modulation signal, and an output, the second optical intensity modulator modulating the second optical signal with the second electrical modulation signal to generate

a second modulated optical signal at the output, wherein at least one parameter of the second optical intensity modulator is chosen to suppress at least one of phase and sideband information in the second modulated optical signal.

[c25] The transmission system of claim 20 further comprising an optical isolator that substantially eliminates reflected optical signals from propagating into the output of the optical intensity modulator.

[c26] The transmission system of claim 20 wherein the at least one parameter of the optical intensity modulator is chosen to increase immunity of the effective modal bandwidth of the multi-mode optical fiber to changes in temperature of at least one of the optical source and the multi-mode optical fiber.

[c27] The transmission system of claim 20 wherein the spatial mode filter increases the effective modal bandwidth of the multi-mode optical fiber.

[c28] The transmission system of claim 20 further comprising a second spatial mode filter having an input that is coupled to an output of the multi-mode optical fiber, wherein the second spatial mode filter further increases the effective modal bandwidth of the multi-mode optical

fiber.

[c29] The transmission system of claim 20 further comprising a receiver having an input that is coupled to an output of the multi-mode optical fiber, the receiver receiving optical signals propagating through the multi-mode optical fiber.

[c30] The transmission system of claim 29 further comprising an active filter that reconstructs dispersed optical signals received by the receiver using electronic dispersion compensation.

[c31] The transmission system of claim 20 wherein the at least one parameter of the optical intensity modulator comprises a bandwidth of the optical intensity modulator.

[c32] The transmission system of claim 20 wherein the at least one parameter of the optical intensity modulator comprises an absorption spectrum of the optical intensity modulator.

[c33] The transmission system of claim 20 wherein the at least one parameter of the optical intensity modulator comprises an extinction ratio of the optical intensity modulator.

[c34] The transmission system of claim 20 wherein the at least

one parameter of the optical intensity modulator comprises an absorption coefficient of the optical intensity modulator.

[c35] A method of generating a modulated optical signal for transmission in a multi-mode optical fiber, the method comprising:

intensity modulating an optical signal having a wavelength with an electrical modulation signal to generate a modulated optical signal, wherein the intensity modulation suppresses at least one of phase and sideband information in the modulated optical signal; and

propagating the modulated optical signal into a multi-mode optical fiber, wherein an effective modal bandwidth of the multi-mode optical fiber is increased by the suppression of the at least one of the phase and the sideband information in the modulated optical signal.

[c36] The method of claim 35 further comprising spatial mode filtering the modulated optical signal before propagating the modulated optical signal through the multi-mode optical fiber.

[c37] The method of claim 35 further comprising spatial mode filtering the modulated optical signal after propagating

the modulated optical signal through the multi-mode optical fiber.

[c38] The method of claim 35 further comprising intensity modulating a second optical signal having a second wavelength with a second electrical modulation signal to generate a second modulated optical signal and propagating the second modulated optical signal into the multi-mode optical fiber.

[c39] The method of claim 35 further comprising preventing reflected optical signals from interacting with the modulated optical signal.

[c40] The method of claim 35 wherein the suppression of the at least one of the phase and the sideband information in the modulated optical signal increases immunity of the effective modal bandwidth of the optical fiber to polarization effects occurring in the multi-mode optical fiber.

[c41] The method of claim 35 wherein the suppression of the at least one of the phase and the sideband information in the modulated optical signal increases immunity of the effective modal bandwidth of the optical fiber to temperature changes occurring in the multi-mode optical fiber.

[c42] An optical transmitter comprising:

means for intensity modulating an optical signal having a wavelength with an electrical modulation signal to generate a modulated optical signal, wherein the intensity modulation suppresses at least one of phase and sideband information in the modulated optical signal; and

means for propagating the modulated optical signal into a multi-mode optical fiber, wherein an effective modal bandwidth of the multi-mode optical fiber is increased by the suppression of the at least one of the phase and the sideband information in the modulated optical signal.